

CLAIMS

What is claimed is:

1. A system for performing a medical treatment in a blood vessel while providing downstream microcirculatory system protection, said system comprising:

a catheter having a longitudinal axis, a distal end, an outer lateral surface, a central guidance lumen extending along the longitudinal axis and opening at said distal end, an annular bypass flow lumen surrounding, and isolated from, said guidance lumen, inlet and outlet openings extending from said lateral surface and communicating with said bypass flow lumen, and first and second balloon inflation lumens extending to said lateral surface at respective first and second locations that are spaced apart along the longitudinal axis and that are between said inlet openings and said outlet openings; and

first and second balloons secured to said lateral surface and each having an interior that communicates with a respective one of said first and second inflation lumens,

wherein said bypass flow lumen terminates distally at a location between said outlet openings and said distal end of said catheter.

2. The system of claim 1 further comprising: a tube dimensioned to surround, and to be movable parallel to the

longitudinal axis of, said catheter, and to move past at least one of said balloons when that balloon is deflated; and a suction source communicating with the interior of said tube.

5 3. The system of claim 2 wherein said catheter is tapered at said distal end.

10 4. The system of claim 2 further comprising an expandable stent mounted or crimped on said first balloon.

15 5. The system of claim 2 wherein said first balloon is a low compliance angioplasty balloon or sheath and said second balloon is a high compliance blocking balloon and is located between said first balloon said outlet openings.

20 6. The system of claim 2 wherein there are a plurality of said inlet openings distributed around the longitudinal axis, and a plurality of said outlet openings distributed around the longitudinal axis, and said outlet openings are located between said inlet openings and said distal end.

 7. The system of claim 1 wherein said catheter is tapered at said distal end.

8. The system of claim 1 wherein said first balloon is a low compliance angioplasty balloon or sheath and said second balloon is a high compliance blocking balloon and is located between said first balloon said outlet openings.

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9. The system of claim 1 wherein there are a plurality of said inlet openings distributed around the longitudinal axis, and a plurality of said outlet openings distributed around the longitudinal axis, and said outlet openings are located between said inlet openings and said distal end.

10. The system of claim 1 further comprising an expandable stent mounted or crimped on said first balloon.